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AUTHOR Croft, Cedric; Thomas, Valerie
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ABSTRACT

This pamphlet on spelling research contains the practical outcomes of two recent studies investigating how children learn to spell. The pamphlet presents the findings and discusses the implications of a study which examined writing samples from 1,250 primary school children, ages 7 through 12, to determine the most frequently used and most frequently misspelled words. One graph and three tables of data are included. The pamphlet also enumerates the results of a second study investigating misspellings that occur due to student lack of understanding of the morphemic structure of multi-syllable words. Three tables of data are included. The pamphlet also considers teaching implications. (KEH)

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GOOD SPELLING

THE SEARCH GOES ON

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By Cedric Croft
NZCER
and
Valerie Thomas
Education Department, Victoria

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Spelling research is making good progress. Two of the areas it is finding very fruitful are:

1 an examination of the words children write — and subsequently misspell;
2 investigation of how we recognise misspellings and remember correct spellings.

This *set* item contains examples of recent works, one of each type:

1 some of the results from a close examination of samples of writing from 1250 primary school children;
2 an account of one of the ways we make new words out of old, and the effect this has on spelling.

Both pieces of research have practical outcomes for teachers. The first project arose out of the need to revise a spelling book. The facts that emerge remind us, if we need reminding, that a relatively small group of words make up a high proportion of children's writing — for primary children 50 words are used so often that they make up about 50% of the words written — but beyond this core of words children have extremely diverse vocabularies. Additionally, although a small common core of frequently misspelled words can be identified, spelling errors tend to be more diverse than personal vocabularies.

The second piece of research gives us some help with untangling that small group of misspellings that occur when two or more meanings are run together to make a new word — did the child who wrote *burthday* know it was made up of *birth* and *day*? Compound words, when understood, are usually easier to spell.

CS212606

Words that Count

Findings from a national survey of primary children's writing

By Cedric Croft
NZCER

The Data

Fifty eight primary schools were approached in 1979 and 1980 for samples of children's writing. The class levels were Standard 1 to Form 2 inclusive (7- to 12-year-olds, Years 2 to 7). A sample of the children's written language was required, that is, stories or paragraphs, not written work carried out as part of classroom exercises in reading, social studies, science, and so on. There was no restriction of topic. The children were not required to write specifically for this exercise and existing written expression was acceptable if:

1 in the majority of cases the samples were of at least 100 words in length;
2 the writing had *not* been corrected or proof-read by anyone other than the child who wrote it;
3 the writing had *not* been rewritten as a 'good copy';
4 each child had had access to spelling references, for example *The Alphabetical Spelling List*, a dictionary, a personal notebook, a class dictionary, but at *no* time had any other person supplied correct spelling;
5 no selection of the pupils' work had been made — samples of written expression were to be submitted for *all* children in the class.

Providing there was no direct help with spelling, normal classroom procedures for written language were to be followed. Where large city schools had several classes at each level a single class was chosen — one with a typical range of abilities for the school.

The Criteria

For this study an error of spelling was defined as:

1 a word used in an appropriate context, but with the letters of the word not conforming to the conventional sequence, for example, *thay* for *they, imediately* for *immediately;*
2 a word with the conventional sequence of letters but in an inappropriate context, for example, *their* where *there* is required, *too* where *to* is required, *a* where *an* is required (a apple).

The Sample

The required number of scripts was chosen randomly so that the writing to be analysed was broadly representative of primary children for class, sex, geographic location, size and type of school. Approximately 100 boys and 100 girls from each class level had their writing examined, 639 boys and 611 girls in all.

It was a relatively straight-forward exercise to get a national sample of primary school pupils. However, the quality of the writing could have been influenced by the topics the children had written about — too many similar subjects might have produced a restricted vocabulary, and possibly distorted our picture of children's spelling. As there was no objective procedure to measure the representativeness of the topics we had to assume that by sampling children from a representative group of schools the topics would also be representative. As it turned out the 1250 essays incorporated 258 separate titles, and because of the broad nature of some of the titles, for example, 'My Favourite Animal', 'Shipwrecked', 'Holidays', more than 400 distinct topics were written about.

Before it was possible to undertake an analysis of the 1250 samples of writing extensive editing was needed for many scripts. This editing was not for style or accuracy of word use, but to 'correct' spelling so that the computer could 'recognise' each word prior to counting and categorising. In addition, all errors of spelling had to be listed separately, so that they could be analysed.

Results

The analysis of the 1250 scripts revealed the following information about the sample of writing.

Table 1

	Male	Female	Total
Total essays analysed	639	611	1,250
Total number of essay titles			258
Total running words (every word counted, including repeats)	89,894	108,774	198,854
Total dictionary of words (only the first occurrence of a word counted, not repeats)	6,335	6,774	9,675
Total running errors (repeated errors included)	4,262	3,517	7,779
Total dictionary of errors (only the first occurrence of an error counted)			2,368
			Overall Average
Average running words per script	140.68	178.03	159.08
Average sentences per script			10.60
Average words per sentence			14.99
Average mistakes per script	6.67	5.77	6.22
Average mistakes per 100 running words	4.74	3.23	3.91

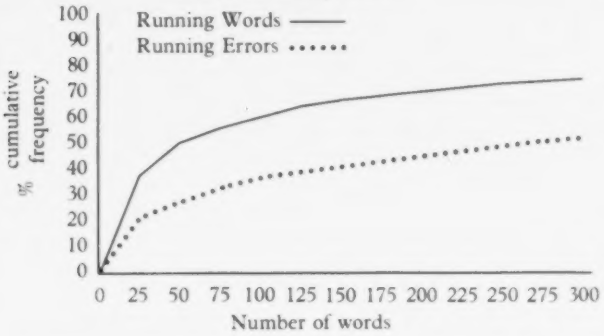
The most obvious feature is the superiority of girls over boys — they wrote more words, they had more extensive writing vocabularies, they wrote longer pieces, and they spelt more accurately, not only in proportion to the number of words they wrote, but over all, as well. The average boy in the sample wrote an essay of 140 words making about 7 mistakes; the average girl wrote 178 words and made about 6 mistakes.

In addition to these essentially descriptive results, analysis of frequency of word use and frequency of misspellings were undertaken. Some of these findings are set out in Graph 1.

The most frequently used word is *the*. It accounted for 11 thousand of the 198,854 words in the 1250 pieces of writing. The second most popular word was *and*, occurring 8410 times, and the next three are *I*, *to* and *a*. If you add all the occurrences of these five words together (to give a 'cumulative frequency') you get 38,938 occurrences in the 198,854 words. Those five words made up 19.58% of all the words written.

Graph 1

Cumulative Proportions of Most Frequent 300 Running Words and Repetitions and Most Frequent 300 Running Errors and Repetitions



The most frequent 300 words and their repetitions account for 75 per cent of all running words. There is a sharp increase for the first 25 running words, a steady increase for the next 100 words, and a gradually slowing rate of increase up to the 300 mark. The first 100 words account for 60 per cent of running words, and the next 100 for another 10 percent and the next 100 for 5 per cent. After that the increase slows steadily.

A similar count can be done for spelling errors. The 300 most frequent spelling errors account for 54 per cent of running errors. The first 25 spelling errors also show a sharp increase, but at a generally lesser magnitude than running words, a steady increase for the next 100, and a steadily decreasing rate thereafter. The first 100 errors account for 35 per cent of running mistakes, the next 100 for an additional 11 per cent and the final 100 for almost 8 per cent.

Their is the most frequently misspelled word, accounting for 162 out of 7779 errors. *Too* is the second most misspelled word, wrong 142 times. *There, off* and *an* follow. Adding all these errors together the cumulative frequency is 595, that is 7.65% of errors — quite a different picture to that of running words.

The two sets of 300 words — those used by the children and those misspelled by the children — follow a roughly similar pattern. The most noticeable differences occur within the first 50s. The first 50 words account for 50% of the words used —a handy statistic to remember. But the first 50 misspellings are only 25% of all the errors. After that point the graphs take on a general similarity.

A closer look at what these figures mean for the teaching of spelling can be taken by having a look at Tables 2 and 3. Here are the 25 most frequently used words, and the 25 most frequently misspelled words.

Table 2
The 25 Most Frequently Used Words

Word	Frequency	Cumulative frequency	Per cent	Per cent cumulative frequency
the	11,330	11,330	5.70	5.70
and	8,410	19,740	4.23	9.93
I	7,487	27,227	3.77	13.70
to	5,916	33,143	2.98	16.68
a	5,795	38,938	2.91	19.59
was	4,006	42,944	2.02	21.61
we	3,515	46,459	1.77	23.38
it	3,273	49,732	1.65	25.03
in	2,804	52,536	1.41	26.44
of	2,436	54,972	1.23	27.67
my	2,078	57,050	1.05	28.72
he	2,001	59,051	1.01	29.73
on	1,950	61,001	.98	30.71
went	1,847	62,848	.93	31.64
had	1,740	64,588	.88	32.52
they	1,619	66,207	.81	33.33
then	1,553	67,760	.78	34.11
when	1,479	69,239	.74	34.85
get	1,385	70,624	.70	35.55
for	1,343	71,967	.68	36.23
that	1,325	73,292	.67	36.89
so	1,280	74,572	.64	37.54
said	1,272	75,844	.64	38.18
up	1,227	77,071	.62	28.80
there	1,223	78,294	.62	39.42

Table 3
The 25 Most Frequently Misspelt Words

Word	Frequency	Cumulative frequency	Per cent	Per cent cumulative frequency
their	162	162	2.08	2.08
too	142	304	1.83	3.91
there	119	423	1.53	5.44
off	91	514	1.17	6.61
an	81	595	1.04	7.65
were	75	670	.96	8.61
a	62	732	.80	9.41
they	60	792	.77	10.18
into	50	842	.64	10.82
to	48	890	.62	11.44
lot	48	938	.62	12.06
where	48	986	.62	12.68
went	47	1,033	.60	13.28
through	45	1,078	.58	13.86
know	44	1,122	.57	14.43
right	43	1,165	.55	14.98
said	41	1,206	.53	15.51
heard	40	1,246	.51	16.02
all	39	1,285	.50	16.52
two	38	1,323	.49	17.01
when	37	1,360	.48	17.49
because	36	1,396	.46	17.95
until	34	1,430	.44	18.39
bought	33	1,463	.42	18.81
again	32	1,495	.41	19.22

These two tables make a fascinating pair. Seven words appear in both lists — that is they are both frequently used and frequently misspelled — *there, a, they, to, went, said, when.* From this evidence, it might look as though a ten-words-a-day, formal spelling programme should pay dividends by starting with this seven. However, *there*, the most frequent spelling error of all can be taught effectively only if the children know when they are using the possessive pronoun, and when they are using the adjective. *To* and *too* present similar difficulties. Words of this nature emphasise the importance of seeing spelling as a skill of meaningful language: in these cases the spelling is dictated by the context, not by phonics, and to spell them correctly, their meanings must be understood. A word such as *there* cannot be taught in isolation from its meaning.

Also from the table we can see that there are only four 2-syllable words in the total of fifty, and all of these are in the list of frequently misspelled words and none in the 25 most frequently used list. (However, they are all in the first 200 most frequently used.) Five of the misspelled words are easily confused because they sound the same — they are homophones — *their/there, too/to/two.* Other words in this list are also homophones, although their 'partners' are not, *right/(write), where/(wear), heard/(herd), know/(no).* Another group are easily confused with similar looking words e.g. *off/(of), through/(though), bought/(brought), where/were* and again an understanding, or at least awareness of the differences in meaning is necessary for correct spelling. Some other errors do have characteristic misspellings, e.g., *thay/they, lott/lot, untill/until, sed/said* and these seem to spring from the irregular nature of sound/letter correspondence.

Discussion

Seventy-five per cent of all words were repetitions of a basic 300. Although this is true it is also important to note that the total dictionary of words in the survey was 9,675. We can identify a relatively small 'common core' of words that will be used by most children, for most writing, but the remaining words that a child may write will be chosen from a much larger universe of possibilities, and in effect, every child has a unique set of words making up a third of his or her written vocabulary.

On the one hand, we have a relatively small common core of words that we all use often. On the other hand, we have the diverse requirements of different individuals writing about a potentially infinite set of different topics. Catering for the development of this aspect of written vocabulary, and ensuring that accuracy of word-use and spelling keep pace with this, is the major challenge of every classroom spelling programme. Published texts can cater for the most often used 'common core' of written words, but supplementary procedures and additional sources are needed if the remainder of each child's written vocabulary is to be developed effectively.

Some findings related to the incidence of spelling errors are also worth considering at this point. In the total of almost 199,000 words written, some 8,000 spelling errors occurred. Of the approximately 9,000 unique words, some 2,000 were misspelled, but of this total 52% were wrong once only. The proportion of frequent spelling errors is nothing like as dramatic as the proportion of frequently used words. The ten most frequently used words and their repetitions occurred 54,972 times, this equalling about 25 per cent of all words written. On the other hand, the ten most frequently misspelled words occurred 890 times and with their repetitions accounted for just 11 per cent of all mistakes, but to account for 25 per cent of all spelling errors, we have to include a total of 45 mistakes.

It is more difficult to identify common errors from samples of children's writing than it is to identify commonly used words. However the message about errors in writing is clear since for any group of children the list of common errors is relatively small. On a class or group basis, there is strong support for ensuring that the common core of written words can be spelt. This will ensure that this group of words (which constitute the bulk of most writing) can be used correctly and spelt conventionally. Most spelling errors, however, are individual, and reflect the diversity of word use found beyond the common core. The only practicable way of catering for this type of error is to isolate the personal spelling errors of each individual, and ensure that meaning and use of the word is mastered, and the sequence of letters is learnt and remembered for future use. Such a system must function in close contact with each individual's written language, and 'self-help' skills using reference resources must be taught.

Remember, spelling is a skill of writing: we learn to spell in order to communicate through writing. During the early stages of learning to express our thoughts in writing the meanings and uses of words must take precedence over spelling — it is the time for adult help and 'creative' spelling. However, at all stages of writing each child needs an individual programme if diverse vocabulary requirements are to be met. There *is* a core of words which must be mastered by all children if they are to become effective writers. Not all children will master these words as they learn to write — these children must have direct (spelling) teaching. This teaching must emphasise skills related to meanings, to uses and to the structures of words. It must not concentrate solely on learning letters in a conventional sequence — a restrictive but still popular view of spelling.

For those children who need direct spelling teaching, who need the extra time and a list of selected words, how should the teacher select and organise a programme? *Firstly*, the words must be words the child needs; they must spring from some aspect of a particular writing programme; the need for them must exist now, or with reasonable certainty in the immediate future. *Secondly*, the skills of using references and proof-reading should be developed from the earliest stages of learning to write. *Thirdly*, there are memorisation and retention techniques that fit each child — visual techniques will often help, some children benefit most from vocalisation, mnemonics help others, spelling rules may help in specific instances. But along with these must go vocabulary extension exercises built around the use of the words in context.

Learning to Spell:
Making Use of Morphemic Information

By Valerie Thomas
Victoria Education Department

Learning to Spell involves much more than simply learning to match sounds and letters. One important element is learning about the morphemic structure of the language. A morpheme is the smallest discrete unit of meaning in the language: a word consists of at least one morpheme, and it may consist of several. For example, *window* has one morpheme, while *windows* has two, the *S* adding the meaning of plurality. *Disagreements* has four morphemes: *dis agree ment s.*

Beginning spellers are unable to make very much use of morphemic information. They may be able to spell *birthday*, a frequently occurring word, but not *birth*; they may be able to spell *every* and *thing*, but not *everything*, because they do not understand the significance of the parts of a compound word. They may write *come* and *cuming*, because they do not realise the relationship between the two words. Of course, it is not just the beginning speller who fails to make use of a morphemic strategy when it is appropriate. Misspellings such as *unecessary, dissappointed* and *disatisfied* are common, and show a lack of understanding of the morphemic structure of words.

Some recent research carried out by the Curriculum Services Unit of the Victorian Education Department examined the use children make of morphemic information when a suffix is added to a word. Four words were used: *soft, soften* and *climb, climber*. *Soft* is a high frequency word, it is short and is phonetically regular. Most children should be able to spell it. If they realise the connection between *soft* and *soften*, *soften* should not be a difficult word to spell. But because *soften* is a much less frequent word, and because the *t* is silent, many children could be expected to misspell it. The final morpheme may also present difficulties.

In both *climb* and *climber*, the *b* is silent. Therefore the children who spell *climb* should also be able to spell *climber*, as long as they can also spell the final morpheme. However *climber* is a less frequent word, and is longer, so that children might be expected to find it more difficult to spell than *climb*.

The children were selected from 30 primary schools chosen at random from the Melbourne metropolitan area. Four children, two girls and two boys, were chosen from each of Years 2, 3 and 4 (7-, 8- and 9-year-olds) in the 30 schools, giving a sample of 360 children. In Year 2, the two girls and two boys whose birth date was closest to 15.2.72 were selected; in Year 3, those closest to 15.2.71, and in Year 4, 15.2.70. This method of selection ensured that the sample of children at each year level was separated from the previous group by an age difference of approximately twelve months. Children who had sight, hearing and speech defects were excluded from the sample, as were newly arrived migrant children: these were defined as children who had not had 2½ years at school in an English speaking country.

Results

Table 1

Total numbers and percentages of children who spelled the words *soft, soften, climb, climber* correctly.

	Soft	Soften	Climb	Climber
YEAR 2	89	7	26	16
	74.2%	5.8%	21.7%	13.3%
YEAR 3	107	34	67	61
	89.2%	28.3%	55.8%	50.8%
YEAR 4	113	63	94	84
	94.2%	52.5%	78.3%	70.0%

It would appear from the results that many of the children were relying on a strategy of matching sounds with letters, sometimes called 'phonics', but more properly "phoneme-grapheme matching'. This would produce the correct spelling for *soft*, but not for *soften*, where the *t* is silent. Because the silent *b* is present in both *climb* and *climber*, children using a phoneme-grapheme strategy would omit the *b* in both words; having learned of the existence of the *b* they would be more likely to use it to spell both *climb* and *climber*. An examination of the data supports this supposition.

The 7-year-olds' most popular spelling for *soften* was *sofen* (29 responses); other spellings at this level were *sofn* (11), *sofin* (8), *sofon* and *soften* (4 examples of each) and one response each of *soffen, soffon, soffn,* and *sofern*. At 8-years-old, *sofen* was still the most common spelling, with 37 responses compared with 34 responses of *soften*. Only at Year 4 level was *soften* the most frequently occurring response, and even at this level there were 34 responses of *sofen*, 11 of *soffen,* and one of *sophen.*

For the *climb/climber* combination there was also a large variety of phonetic spellings but, in general, once the *b* was included, *climb* was spelled correctly. However, being able to spell *climb* was no guarantee of being able to spell *climber*, and in 12 cases, children who spelled *climb* correctly within the word *climber*, misspelled the word *climb* in isolation. Comparisons were made and here are the results.

Table 2

Percentages of children in six categories, for the *climb/climber* comparison.

	YEAR 2	YEAR 3	YEAR 4
1. Correct in both words	15.8	45.8	68.3
2. Correct only in *climb*	5.8	10.0	10.0
3. Correct only in *climber*	0.8	5.8	3.3
4. Wrong — consistent e.g. *clim, clima*	24.2	18.3	11.7
5. Wrong — inconsistent e.g. *klim, climer*	51.7	20.0	5.8
6. No attempt in one or both words	1.7	0	0.8

The number of children not using morphemic information decreased as the time at school increased: Year 2 : 59.3%; Year 3 : 35.8%; Year 4 : 19.2%. This result comes from assuming that categories 2, 3 and 5 are made up of children not using morphemic information. The numbers of children in these categories were combined and the percentages were calculated after omitting those who made no attempt.

When the equivalent calculations were made for the *soft/soften* combination, some interesting variations emerge.

Table 3

Percentages of children in the six categories, for the *soft/soften* comparison.

	YEAR 2	YEAR 3	YEAR 4
1. Correct in both words	13.3	33.3	54.2
2. Correct only in *soft*	60.0	56.7	40.0
3. Correct only in *soften*	0	0.8	0
4. Wrong — consistent e.g. *sofft, soffn*	0	1.6	0
5. Wrong — inconsistent e.g. *sofft, sofan*	24.2	6.7	5.0
6. No attempt in one or both words	2.5	0.8	0.8

Because of the difficulty caused by the silent *t* numbers were much greater in Category 2 than for the *climb/climber* combination, and only two children made consistent errors, compared with 65 for *climb/climber*. For *soft/soften* comparison the percentages of children apparently not using morphemic information were greater than for *climb/climber* at every year level: Year 2 : 86.3%; Year 3 : 64.7%; Year 4 : 45.4%.

Conclusion

A very large number of children at each year level could spell *soft*, but not *soften*.

Children are often not aware of the morphemic structure of words they are attempting to spell.

The most common strategy used to spell *soft/soften* appeared to be a phoneme-grapheme matching strategy, which produced the correct spelling for *soft*, but not *soften*. This was particularly so for the 7-year-olds but was still clearly in evidence at 9 years old; the Year 4 child who wrote *sophen* was not relating *soft* and *soften*. There were considerable numbers of children who were able to spell *climb* correctly, but misspelled it on its own.

Knowing how to spell a word in one context does not ensure correct spelling in another context.

Further Evidence

Further evidence about the inability of some children to make use of morphemic information was obtained from the investigation of the children's spelling of compound words which was carried on at the same time. For example, while 301 children spelled *some* correctly, and 339 could spell *one*, only 252 produced the correct spelling for *someone*. Similarly, 275 could spell *news*, 280 could spell *paper*, but only 200 could spell *newspaper*. It was clear that many children had not understood the significance of the parts of the compound words.

However, it was not always the compound word which was difficult to spell. While 249 of the children could spell *birthday*, only 178 could spell *birth*. *Birthday* is a word which is very familiar to many children, and they learn to spell it without realising the meaning of the two component words. Then, when they attempt to spell *birth*, they approach it as an unknown word. They have the knowledge necessary to spell *birth* correctly, but are unable to make use of it.

Implications for Teaching

Such results suggest that many children need to have their attention directed to the structure of words. With compound words, incidental discussion can be particularly valuable. Why is it called a *rainbow*? A *grasshopper*? The *afternoon*? Such discussion, when the words occur in reading or conversation, encourages children to look more closely at the parts of the words. Activities which allow children to manipulate the parts of compound words are also useful: how many words can be made using *some, one, any, thing, every*? How many compound words contain the words *hand*? *Handwork, handkerchief, handcuff, handbag* . . .

With words such as *soft, soften, climb, climber*, the different parts of the words should be taught together, so that the children can see the connections between them. Instead of *climb* being presented as a single word, it could be taught with *climbed, climber, climbing*. This can be most helpful with words such as *soften*, with a silent letter. If *sign* is taught with *signal* and *signature*, the *gn* letter combination, so unlikely from the sound of *sign*, is easier to remember.

Teaching such as this encourages children to look more perceptively at words, and to find that there is some logic in our spelling system.

The research described in this article is reported in detail in Research /Report 1/82 *Learning to Spell, The Way Children Make Use of Morphemic Information* by Valerie Thomas, published by the Curriculum Services Unit of the Victorian Education Department, 234 Queensbury Street, Carlton, Australia 3053.